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EXAMINER	
TORRES, JUAN A	
ART UNIT	**PAPER NUMBER**
2611	

DATE MAILED: 06/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/022,659	AZADET ET AL.	
	Examiner	Art Unit	
	Juan A. Torres	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,7-10,12 and 15-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,7-10,12 and 15-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

In view of the amendment filed on 05/12/2006, the Examiner withdraws claim objections to claim 5 of the previous Office action.

Response to Arguments

Regarding claims 16-19:

Applicant's arguments filed on 05/12/2006 have been fully considered but they are not persuasive.

The Applicant contends, "Raghaven does not disclose or suggest "generating each of said trellis states with at least two branches leaving or entering each state, each of said at least two branches corresponding to state transitions associated with said two binary values, wherein a first binary value causes a state transition in said trellis and a second binary value does not cause a state transition in said trellis," as required by claim 16, as amended".

The Examiner disagrees and asserts, that, Raghavan discloses a method for representing an MLT-3 code as a trellis, the MLT-3 code uses three signal levels to represent two binary values (figure 1A column 3 lines 37-50), the method comprising generating the trellis with a plurality of trellis states, each of the trellis states associated with a value for a signal in a previous symbol period (figure 1A column 3 lines 37-50); and generating each of the trellis states with at least two branches leaving or entering each state, each of the at least two branches corresponding to state transitions associated with the two binary values, where a first binary value causes a state

transition in the trellis and a secondary binary value does not cause a state transition in the trellis (figure 1A column 3 lines 37-50). For these reasons and the reason stated en the previous Office action, the rejection of claims 16-19 are maintained.

Regarding claims 1 and 8:

Applicant's arguments with respect to claims 1 and 8 have been considered but are moot in view of the new ground(s) of rejection.

Regarding claims 2-7, 9-15 and 17-22:

Applicant's arguments with respect to claims 10, 12 and 21 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 is rejected because depends from claim 11, and claim 11 is a cancelled claim.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 16-22 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

As per claim 16, claim 16 is rejected under 35 USC 101 because the claimed invention as a whole is directed to solely an abstract idea or to manipulation of abstract ideas or does not produce a useful result.

As per claims 17-22, clams 17-22 are rejected because they depend directly from claim 16, and claim 16 is rejected.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 16-19 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Raghavan (US 6418172 B1).

As per claim 16, Raghavan discloses a method for representing an MLT-3 code as a trellis, the MLT-3 code uses three signal levels to represent two binary values (figure 1A column 3 lines 37-50), the method comprising generating the trellis with a plurality of trellis states, each of the trellis states associated with a value for a signal in a previous symbol period (figure 1A column 3 lines 37-50); and generating each of the trellis states with at least two branches leaving or entering each state, each of the at

least two branches corresponding to state transitions associated with the two binary values, where a first binary value causes a state transition in the trellis and a secondary binary value does not cause a state transition in the trellis (figure 1A column 3 lines 37-50).

As per claim 17, Raghavan discloses claim 16. Raghavan also discloses that a first one of the plurality of trellis states corresponds to a value for a signal in a previous symbol period of +1 (figure 1A column 3 lines 37-50).

As per claim 18, Raghavan discloses claim 16. Raghavan also discloses that a second and third of the plurality of trellis states corresponds to a value for a signal in a previous symbol period of 0 (figure 1A column 3 lines 37-50).

As per claim 19, Raghavan discloses claim 16. Raghavan also discloses that a fourth one of the plurality of trellis states corresponds to a value for a signal in a previous symbol period of -1 (figure 1A column 3 lines 37-50).

As per claim 22 Raghavan disclose claim 16. Raghavan also discloses an Ethernet channel (column 1 lines 11-34).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 8, 9, 15, 23, 24, and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spinnler ("Design of hyper states for reduced-state sequence

estimation". Spinnler. IEEE International Conference on Communications.1995. ICC 95 Seattle, Gateway to Globalization, 1995 Volume 1, 18-22 June 1995 Page(s): 1 - 6 vol.1) in view of Raghavan (US 6418172 B1).

As per claims 1 and 8, Spinnler discloses decoding a encoded signal received from a dispersive channel causing intersymbol interference, comprising generating at least one trellis representing the code and the dispersive channel and performing joint equalization and decoding of the received signal using the trellis (abstract, and section I introduction page 1). Spinnler doesn't disclose that the signal encoded using the MLT-3 code. Raghavan discloses the MLT-3 encoding (column 1 lines 24-36). Spinnler and Raghavan teachings are analogous art because they are from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate the MLT-3 encoding disclosed by Raghavan with the digital video signals disclosed by Spinnler. The suggestion/motivation for doing so would have been to use joint equalization and decoding in a well known encoding technique (Raghavan column 1 lines 24-36).

As per claims 2 and 9, Spinnler and Raghavan disclose claims 1 and 8. Spinnler also discloses decoding an encoded signal received (abstract, and section I introduction page 1).

As per claim 15, Spinnler and Raghavan disclose claim 8. Raghavan also discloses an Ethernet channel (column 1 lines 11-36). Spinnler and Raghavan teachings are analogous art because they are from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of

ordinary skill in the art to incorporate the MLT-3 encoding disclosed by Raghavan with the digital video signals disclosed by Spinnler. The suggestion/motivation for doing so would have been to use joint equalization and decoding in a well known encoding technique (Raghavan column 1 lines 24-36).

As per claims 23 and 27, Spinnler and Raghavan disclose claims 1 and 8. Spinnler also discloses that a state in the trellis is given by a concatenation of the code state and a channel state, where the channel state describes the dispersive channel (abstract, and section I introduction page 1). Spinnler doesn't disclose that the signal encoded using the MLT-3 code. Raghavan discloses the MLT-3 encoding (column 1 lines 24-36). Spinnler and Raghavan teachings are analogous art because they are from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate the MLT-3 encoding disclosed by Raghavan with the digital video signals disclosed by Spinnler. The suggestion/motivation for doing so would have been to use joint equalization and decoding in a well known encoding technique (Raghavan column 1 lines 24-36).

As per claims 24 and 28, Spinnler and Raghavan disclose claims 1 and 8. Spinnler also discloses that a state in the trellis is given by a concatenation of the code state and a channel state, where the channel state describes the dispersive channel (abstract, and section I introduction page 1). Spinnler doesn't disclose that the signal encoded using the MLT-3 code. Raghavan discloses the MLT-3 encoding (column 1 lines 24-36). Spinnler and Raghavan teachings are analogous art because they are

from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate the MLT-3 encoding disclosed by Raghavan with the digital video signals disclosed by Spinnler. The suggestion/motivation for doing so would have been to use joint equalization and decoding in a well known encoding technique (Raghavan column 1 lines 24-36).

As per claims 26 and 29, Spinnler and Raghavan disclose claims 24 and 28. Spinnler also discloses that number of states in the trellis is given by $4x(2^K)$, where K is the truncated channel memory (section 2 system model. In this case Zs=4 for MLT-3). Spinnler doesn't disclose that the signal encoded using the MLT-3 code. Raghavan discloses the MLT-3 encoding (column 1 lines 24-36 with 4 states In this case Zs=4 for MLT-3). Spinnler and Raghavan teachings are analogous art because they are from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate the MLT-3 encoding disclosed by Raghavan with the digital video signals disclosed by Spinnler. The suggestion/motivation for doing so would have been to use joint equalization and decoding in a well known encoding technique (Raghavan column 1 lines 24-36).

Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raghavan as applied to claim 16 in view of Spinnler ("Design of hyper states for reduced-state sequence estimation". Spinnler. IEEE International Conference on Communications.1995. ICC 95 Seattle, Gateway to Globalization, 1995 Volume 1, 18-22 June 1995 Page(s): 1 - 6 vol.1).

As per claim 20, Raghavan discloses claim 16. Raghavan doesn't disclose using the trellis to perform joint equalization and decoding of a encoded signal. Spinnler discloses using the trellis to perform joint equalization and decoding of a encoded signal (abstract, and section I introduction page 1). Spinnler and Raghavan teachings are analogous art because they are from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate the MLT-3 encoding disclosed by Raghavan with the digital video signals disclosed by Spinnler. The suggestion/motivation for doing so would have been to use joint equalization and decoding in a well known encoding technique (Spinnler abstract).

As per claim 21, Raghavan discloses claim 16. Raghavan doesn't disclose combining the trellis with a trellis representing a channel to obtain a super trellis. Spinnler discloses combining the trellis with a trellis representing a channel to obtain a super trellis (abstract, and section I introduction page 1). Spinnler and Raghavan teachings are analogous art because they are from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate the MLT-3 encoding disclosed by Raghavan with the digital video signals disclosed by Spinnler. The suggestion/motivation for doing so would have been to use joint equalization and decoding in a well known encoding technique (Spinnler abstract).

Claims 10, 12 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spinnler and Raghavan as applied to claim 9 above, and further in view of

Polydoros (US 5432821 A). (Examiner NOTE: all these techniques are inherently discloses by Spinnler in the abstract and introduction sections, Polydoros is used to provide the specific detail).

As per claim 10, Spinnler and Raghavan disclose claim 9. Spinnler and Raghavan don't specifically disclose a branch metric units (BMU) that calculates branch metrics based on the received signal; an add-compare-select unit (ACSU) that determines the best surviving paths into the reduced states; a survivor memory unit (SMU) that stores the best surviving paths; and a decision-feedback unit (DFU) that takes survivor symbols from the SMU to calculate ISI estimates for the reduced states, where the ISI estimates are used by the BMU to calculate branch metrics for transitions in the reduced-state trellis. Polydoros discloses a branch metric units (BMU) that calculates branch metrics based on the received signal (figure 13 block 104; column 23 line 64 to column 24 line 34); an add-compare-select unit (ACSU) that determines the best surviving paths into the reduced states (figure 13 block 108; column 23 line 64 to column 24 line 34); a survivor memory unit (SMU) that stores the best surviving paths (figure 13 block 110; column 23 line 64 to column 24 line 34); and a decision-feedback unit (DFU) that takes survivor symbols from the SMU to calculate ISI estimates for the reduced states, where the ISI estimates are used by the BMU to calculate branch metrics for transitions in the reduced-state trellis (figure 13 block 102; column 23 line 64 to column 24 line 34). Spinnler, Raghavan and Polydoros teachings are analogous art because they are from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to

incorporate the method for estimating data sequences by Polydoros with the receiving system disclosed by Spinnler and Raghavan. The suggestion/motivation for doing so would have been to cancel the residual ISI (Polydoros column 5 lines 7-8).

Examiner NOTE regarding claim 12:

The best the Examiner can think of, about the dependency of claim 12, is that claim 12 should depend from claim 9.

As per claim 12, Spinnler and Raghavan disclose claim 9. Spinnler and Raghavan don't specifically disclose a branch metric units (BMU) that calculates branch metrics based on the received signal; an add-compare-select unit (ACSU) that determines the best surviving paths into the reduced states; and a survivor memory unit (SMU) that stores the best surviving paths. Polydoros discloses a branch metric units (BMU) that calculates branch metrics based on the received signal (figure 13 block 104; column 23 line 64 to column 24 line 34; and figure 14 block 204 column 24 lines 35-53); an add-compare-select unit (ACSU) that determines the best surviving paths into the reduced states (figure 13 block 108; column 23 line 64 to column 24 line 34; and figure 14 block 208 column 24 lines 35-53); a survivor memory unit (SMU) that stores the best surviving paths (figure 13 block 110; column 23 line 64 to column 24 line 34; and figure 14 block 210 column 24 lines 35-53). Spinnler, Raghavan and Polydoros teachings are analogous art because they are from the same field of endeavor of digital communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate the method for estimating data sequences by Polydoros with the receiving system disclosed by Spinnler and Raghavan. The

suggestion/motivation for doing so would have been to cancel the residual ISI (Polydoros column 5 lines 7-8).

As per claim 25, Spinnler and Raghavan disclose claim 24 Spinnler and Raghavan don't specifically disclose the steps of computing ISI estimates for the states using symbols from corresponding survivor paths (figure 13 block 106; column 23 line 64 to column 24 line 34; and figure 14 block 210 column 24 lines 35-53); computing branch metrics for transitions in the trellis based on the ISI estimates (figure 13 block 104; column 23 line 64 to column 24 line 34; and figure 14 block 204 column 24 lines 35-53); determining survivor paths into the states based on the branch metrics (figure 13 block 108; column 23 line 64 to column 24 line 34; and figure 14 block 208 column 24 lines 35-53); and storing the survivor paths (figure 13 block 110; column 23 line 64 to column 24 line 34; and figure 14 block 210 column 24 lines 35-53). Polydoros discloses the steps of computing ISI estimates for the states using symbols from corresponding survivor paths; computing branch metrics for transitions in the trellis based on the ISI estimates', determining survivor paths into the states based on the branch metrics; and storing the survivor paths.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Eyuboglu, M.V.; Qureshi, S.U.H.; (Reduced-state sequence estimation with set partitioning and decision feedback". IEEE Transactions on Communications Volume 36. Issue 1, Jan. 1988 Page(s):13 – 20) describes a reduced-state sequence estimator for linear intersymbol interference (ISI) channels, the

estimator uses a conventional Viterbi algorithm (VA) with decision feedback to search a reduced-state "subset trellis" which is constructed using set partitioning principles; the complexity of maximum likelihood sequence estimation (MLSE) due to the length of the channel memory and the size of the signal set is systematically reduced. Eyuboglu, M.V.; Qureshi, S.U.H.; ("Reduced-state sequence estimation for coded modulation of intersymbol interference channels. IEEE Journal on Selected Areas in Communications, Volume 7, Issue 6, Aug. 1989 Page(s):989 – 995) discloses detection of trellis codes designed for intersymbol interference-free channels when they operate in the presence of intersymbol interference (ISI); describing a well-structured reduced-state sequence estimation (RSSE) algorithm is which can achieve the performance of maximum-likelihood sequence estimation (MLSE) at drastically reduced complexity; a special case of RSSE, called parallel decision feedback decoding (PDFD), uses the encoder trellis, yet on channels with large attenuation distortion it can provide a significantly better performance than linear equalization. Tortelier (US 7012976 B1) discloses decoding and of joint equalization of a digital signal protected by a code defined by a trellis.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is (571) 272-3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juan Alberto Torres
05-29-2006

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PRIMARY EXAMINER